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Abstract

Background: The underlying cause of fractional flow reserve (FFR) reduction and prognostic impact of FFR after optimal DES implantation remain unknown. The study aims were to use intravascular ultrasound (IVUS) to investigate the mechanism responsible for reduced FFR after optimal drug-eluting stent (DES) implantation and to evaluate FFR effect on clinical outcomes after optimal percutaneous coronary intervention with DES.

Methods and Results: Ninety-seven patients treated with optimal DES implantation under IVUS and pullback FFR guidance were followed clinically (median 17.8 months). Post-stenting IVUS examination and pullback FFR recording were performed, and angiographic and IVUS parameters associated with reduced FFR were evaluated. The composite of major adverse cardiac events (MACE), including cardiac death, myocardial infarction, stent thrombosis, and target vessel revascularization, was analyzed. Regression analysis showed inverse correlations between post-stent FFR and residual plaque volume index ($r = -0.40$, $p < 0.01$) and residual percent plaque volume ($r = -0.68$, $p < 0.01$) in IVUS but no correlation of minimal lesion diameter with quantitative coronary angiography ($r = 0.07$, $p = 0.50$) or IVUS-derived minimal stent area ($r = 0.02$, $p = 0.84$). MACE was observed in 10 patients (10.3%), and FFR after

optimal stenting was significantly lower in this group (0.86 ± 0.04 vs 0.91 ± 0.04, $p < 0.01$). The optimal FFR threshold for predicting MACE was 0.90, identified by the receiver operating characteristic curve.

Conclusions: Reduced FFR after optimal DES implantation was associated with residual plaque volume identified by IVUS and future adverse cardiac events.